a feature size no greater than 0.5 μm at at least a portion of a surface of the sample.

26. A method according to claim 1, further comprising the step of etching the surface of the sample so as to obtain vertical sidewalls and a flatly etched bottom surface.

27. A method according to claim 1, further comprising the step of etching the surface of the sample so as to increase a degree anisotropy of etching and to increase the etched selectivity.--

REMARKS

By the above amendment, new dependent claims 24-27 have been presented, which further define features of the present invention.

The rejection of claims 1-7 under 35 U.S.C. §102(e) as being anticipated by U.S. Patent 6,129,806 issued to Kaji et al is traversed, and reconsideration and withdrawal of the rejection are respectfully requested.

At the outset, in order to support a rejection under 35 U.S.C. §102, reference is made to the decision of Ex parte Levy, 17 USPQ 2d 1461 (PTO of Bd. of App. & Int. 1990), wherein the board pointed out that the factual determination of anticipation requires the disclosure in a single reference of every element of the claimed invention and it is incumbent

upon the Examiner to identify wherein each and every facet of the claimed invention is disclosed in the applied reference.

Turning to independent claim 1 from which dependent claims 2-7 as well as newly added dependent claims 24-27 depend, claim 1 recites the features of a method of treating a surface of a sample, comprising the steps of generating a plasma in a treatment chamber, applying an rf bias voltage to a stage on which a sample is placed independently of the generation of the plasma, and on-off modulating an rf bias voltage to which a peak to peak voltage Vpp value larger than a Vpp value of a continuous rf bias voltage at which the same etch rate can be obtained is given. Applicants submit that such features are not disclosed by Kaji et al in the sense of 35 U.S.C. §102, and this fact has been recognized by the Examiner. More particularly, the Examiner indicates that with regard "to the limitation of claim 1 that the Vpp of the pulse bias be greater than the Vpp for continuous bias process producing the same etch rate, the Examiner considered this to be an inherent feature of a pulse bias process". The Examiner then sets forth reasoning which is based upon an attempt to meet the claimed limitations irrespective of the disclosure of Kaji et al.

More particularly, Kaji et al provides no disclosure of any relationship of the peak to peak voltage Vpp value of the on-off modulated rf bias voltage with respect to that of a Vpp value of a continuous rf bias voltage. Whether or not Kaji et

al can be operated in a manner which such feature would be obtained is not a proper consideration under 35 U.S.C. §102 or 35 U.S.C. §103, but rather whether Kaji et al discloses or teaches such feature.

Reference is made to page 36 of the Substitute Specification which describes features as recited in the claims of this application, which enable treatment of the sample so that the degree of anisotropy can be improved without deteriorating the selectivity.

Referring to Figs. 3-7 of the drawings of this application, it is noted that Fig. 3(a) shows waveforms of rf biases corresponding to etch parameters of the present invention, showing a waveform when the rf bias frequency is 100 kHz and the on-off frequency (modulating frequency) is 100 Hz, whereas Fig. 3(b) shows a waveform when the rf bias frequency is 1 kHz and the on-off frequency (modulating frequency) is 1 Hz in accordance with the disclosure of U.S. Patent No. 5,352,324, which is described in the specification of this application as a prior art arrangement. In accordance with the present invention as illustrated in Fig. 4, when the frequency lies in a range from about 100 kHz to a few MHz as shown by the 100 kHz characteristic, the energy of the ions has a saddle-shape distribution compared to that of the wide distribution of the 1 kHz characteristic. In accordance with the present invention as illustrated in Fig. 5, utilizing the parameters as described at page 11 of the specification, a

fine pattern comprising lines and spaces wherein the width of each line is 0.4 μm and the width of each space is 0.4 μm is obtained, with vertical sidewalls 507 and flat bottom surfaces 505. In contradistinction, Figs. 6 and 7 show etched profiles as comparative examples, wherein Fig. 6 shows the profile in which the frequency of the bias power supply is set to 1 kHz and the on-off frequency is set to 1 Hz and in Fig. 7, the rf bias frequency is set to 100 kHz and a continuous output power was set to 60 W. In each of Figs. 6 and 7, the sidewalls 507 are not vertical and the bottom surfaces are not flat, noting that in Fig. 7, wherein etching is performed with a continuous wave bias, a fine trench 509 called a micro-trench is formed on the bottom surface. These deficiencies are described at pages 12-14 of the specification of this application. Fig. 8 shows the relation between etch rate of polysilicon and etch selectivity wherein a case using a continuous wave bias and a case using an on-off bias are compared and as described at pages 16 and 17 of the Substitute Specification, it is considered that the reason why selectivity is increased by the on-off bias modulation is that reaction products are deposited on the oxide film during the off period of the rf bias, thereby reducing the etch rate of the oxide film. As pointed out, the reaction products are deposited on the oxide film during the off period and the selectivity is higher as compared with that of the continuous wave bias at the same Vpp and that of the continuous wave bias with the parameter of Vpp

at which the same etch rate can be obtained. In the on-off bias modulation, when the ion energy is made higher than the amplitude Vpp of the continuous bias case, the etch rate of the oxide film increases and the same selectivity as that in the case of using the continuous wave bias is obtained. Thus, as pointed out, in accordance with the embodiment of Fig. 5 of the drawings of this application, a highly anisotropic etching without any microtrench can be realized. Thus, the specification of this application and the drawings clearly describe the relationship as set forth in claim 1, and such features as recognized by the Examiner are not disclosed or taught by Kaji et al. As such, applicants submit that claim 1 and the dependent claims patentably distinguish over Kaji et al in the sense of 35 U.S.C. §102, and should be considered allowable thereover.

With regard to the Examiner's contention concerning "inherency", applicants submit that the Examiner's position is based upon hindsight analysis of the present application in an attempt to meet the claimed limitations. Reference is made to the decision of In re Robertson, 49 USPQ 2d 1949 (Fed. Cir. 1999), wherein the court pointed out that if the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if that element is "inherent" in its disclosure. However, the court indicated that to establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily

present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Furthermore, the court pointed out that "inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." (emphasis added) Applicants submit that the specification of this application and the examples provided show that while etching may be effected in different manners, but only by utilizing the relationship as recited in claim 1 and therewith the dependent claims, will proper etching as illustrated in Fig. 5 of the drawings of this application be obtained in relation to the arrangements of the comparative examples of Figs. 6 and 7 based upon the prior art. Since Kaji et al may be considered to be representative of the prior art of the comparative examples and fails to disclose the relationship, as claimed, it is apparent that claim 1 and the dependent claims patentably distinguish in the sense of 35 U.S.C. §102, and all claims should be considered allowable thereover.

With respect to the dependent claims, the features of claims 2-7 are described at page 36 of the Substitute Specification, and the features of dependent claims 24-27 are described in the specification and must be considered in conjunction with parent claim 1 and patentably distinguish over Kaji et al for the reasons given above.

With regard to the art referred to by the Examiner and

not applied to the claims of this application, applicants submit that such references also fail, as recognized by the Examiner to disclose the claimed relationship as set forth in claim 1 and the dependent claims, such that all claims present herein patentably distinguish thereover.

In view of the above amendments and remarks, applicants submit that all claims present in this application should now be in condition for allowance and issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (503.36911X00) and please credit any excess fees to such deposit account.

Respectfully submitted,

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